R E M A R K S

This paper is responsive to an *Official Action* that was issued in this case on November 2, 2007. In that *Action*, the Examiner rejected all of pending claims 1-15. In particular, claims 8 and 10-15 were rejected under 35 USC §102 as being anticipated by US. Pat. No. 5,814,524 to Walt *et al*. and claims 1, 3-6, and 9 were rejected under 35 USC §103 as being obvious over Walt *et al*. and further in view of one or more of U.S. Pat. Nos. 5,980,120 to Narayannan, 4,972,042 to Seabourne, or 3,368,247 to Orban.

Claims 1, 8, 12, and 13 are amended to improve the clarity and specificity thereof. It is not believed that such amendments were necessary to overcome the pending rejections. Reconsideration is requested in view of the foregoing amendment and the following comments.

Claims 1-7 are Allowable
<u>Over the Art of Record</u>

Amended independent claim 1 recites an apparatus comprising:

> a plurality of optical fibers, wherein:
>
> said optical fibers each having a first end and a second end;
>
> said fibers are capable of transmitting infrared radiation ("IR");
>
> a sensor for sensing IR, wherein said sensor is in IR-sensing contact with said first end of each of said optical fibers;
>
> a separator, wherein said separator engages said plurality of fibers and is suitable for spatially separating said optical fibers from one another in a pattern that enables said optical fibers to physically engage individual samples on a sample plate.

The Examiner alleges that claim 1 is unpatentable over the combination of Walt *et al*. and Narayannan. Specifically, the Examiner alleges that Walt *et al*. teaches all limitations with the exception of the "separator." The Examiner, however, alleges that Narayannan teaches the separator, citing to col. 6, lines 50-56. The Examiner concludes that it would have been obvious to modify Walt *et al*. with Narayannan because "according to Narayannan this would allow the fiber array to be held close as possible to the sensing surface of the sensor to prevent the diffraction of light such that the area of the projected light falls beyond the

electrodes. (Col. 6, lines 41-56)." As will be demonstrated below via analysis of these references, the Examiner's conclusion is not supportable.

Walt *et al*. discloses an optical sensor for far field viewing and making optical analytical measurements at remote locations. The sensor includes an imaging fiber, which comprises a fiber optic array and a GRIN lens. The GRIN lens is at the end of the optic array nearest the object being viewed.

Walt *et al*. disclose that the fiber optic array is a preformed bundle composed of a plurality of fibers (102). The discrete unitary optic array has a <u>fixed and determinable configuration and set dimensions</u>." (Emphasis added, col. 9, lines 58-65, *see also*, col. 8, lines 11-15.)

In preferred embodiments, the fibers in the array are straight relative to one another (FIG. 3), such that the end faces of the fibers are correlatable to one another via a two-dimensional coordinate system (FIGs. 4 and 5). (Col. 10, lines 1-38.) In some less-preferred embodiments, the arrangement of fibers can be random. In such embodiments, light would have to be injected into each fiber, on a fiber-by-fiber basis, to determine how the two end faces correlate to one another. (Col. 10, line 48 – col. 11, line 19.)

But regardless of the whether the fibers are straight or random, they are in a fixed position relative to one another in the array.

Walt *et al*. explicitly discloses that the target or object being viewed is NOT in contact with an optical fiber in the optical array: "the object being viewed is not to be in direct contact with the imaging fiber, but instead lies remote from the imaging fiber within a pre-set range of distances." (Col. 6, lines 58-61.) This is enabled by a GRIN lens, which is disposed on the end of the fiber. Walt *et al*. characterizes the GRIN lens as an essential element of the inventive combination (col. 6, lines 32-36) and expounds on its advantages col. 6, lines 53-64.

To make optical measurements, *etc*., the end of the imaging fiber that is remote from the GRIN lens is coupled to an assembly comprising lenses, a CCD camera, *etc*., as depicted in FIG. 8 and discussed at col. 15, lines 18-47.

In operation, excitation light from light source (500) is conducted to a reaction substrate through imaging fiber (300). Furthermore, fluorescence, *etc*., resulting from reaction at the reaction substrate is conducted through imaging fiber (300) to the ccd camera (512). (See also FIG. 9, note: the imaging fiber (300) is the combination of the array 100 plus GRIN lens 200.)

As depicted in FIG. 8, the imaging fiber (300) is attached to xyz micro-positioner (506). The micro-positioner (506) is used to adjust the distance and location of the end of imaging fiber (300) relative to object lens (504). Light that emerges from the reaction substrate exits imaging fiber (300) and is collected by object lens (504). It is then transmitted through dichroic mirror (503), filtered in filter wheel (510), and detected by ccd camera (512).

So, in addition to anything else that Walt *et al*. teaches or discloses:

- The position of the fibers in optic array are preset and not movable;
- The optical fibers are not in direct contact with the object being viewed; and
- The end of the imaging fiber that is remote from the object being viewed is attached to an xyz micropositioner.

The secondary reference, Narayannan, is directed to a fiber array test method and apparatus. This apparatus, which is best shown in FIG. 4, is used to verify that optical fibers within a fiber array are properly situated.

The Examiner alleges that Narayannan discloses the separator, recited in applicant's claim 1, which is suitable for spatially separating optical fibers in a pattern that enables the optical fibers to engage samples on a sample plate. The Examiner cites to col. 6, at lines 50-56.

With reference to FIG. 4 and the cited passage, it seen that fiber array (51) is held by fixture (86) proximal to the sensing surface of sensor (89). Presumably, the Examiner is characterizing fixture (86) as applicant's "separator."

Regardless of whether it is appropriate to call fixture (86) a "separator," it clearly does not and cannot provide the functionality that is claimed for applicant's separator. In particular, fixture (86) does not "spatially separate" fibers from one another as recited in claim 1. The position of each fiber in the fiber array (51) is fixed. In fact, that's the point of the Narayannan's invention — to determine if the fibers are properly located in the array! Rather, fixture (86) simply fixes fiber array (51) in position in front of the sensor.

The Examiner's stated reason for the combining Walt *et al*. with Narayanna was to "allow the fiber array to be held as close as possible to the sensing surface …." A few reasons are provided below why this combination is inappropriate and, even if made, would not yield the claimed invention.

<u>Rebuttal point no. 1</u>: Fixture (86) has nothing to do with the relative closeness of fiber array (51) to sensor (89). The fixture simply supports fiber array (51); the array, as

supported by fixture (86), could be placed either far from or close to sensor (89). Of course, the invention wouldn't work if array (51) was far from sensor (89), but the point is fixture (86) doesn't control this distance.

<u>Rebuttal point no. 2</u>: There is no justification (or reason) for modifying Walt *et al.* by Narayanna in the manner proposed by the Examiner. The function attributed to the fixture (86) by the Examiner (a function that it does NOT perform) is already being performed, at least to a certain extent, by xyz positioner (506) of Walt *et al*. (*See* FIG. 8). The xyz positioner changes the position of the end of the fiber relative to an objective lens (504). Of course, the xyz positioner doesn't hold the fiber "as close as possible" to the objective lens; rather, it holds it at an appropriate distance for efficiently coupling from the end of the fiber to the objective lens. But, there is no need to modify Walt *et al*. by Narayanna — at least for the reason stated by the Examiner, since there exists an element in Walt *et al*. (xyz positioner 506) that provides a function similar to the function that is incorrectly attributed to fixture (86)!

<u>Rebuttal point no. 3</u>: More important than either of points 1 or 2 above, Narayanna doesn't disclose a separator that "spatially separates" fibers from one another as recited in claim 1.

<u>Rebuttal point no. 4</u>: More important than either of points 1, 2, or 3 above, Walt *et al*. could NOT use a separator that "spatially separates" fibers from one another as recited in claim 1. The position of the fibers in the optical array of Walt *et al*. is FIXED, as previously discussed!

<u>Rebuttal point no. 5</u>: Claim 1 recites that the "separator … engages said plurality of fibers and is suitable for spatially separating said optical fibers from one another in a pattern that enables said optical fibers <u>to physically engage</u> individual samples on a sample plate." In applicant's invention, the ends of some of the fibers <u>capture and immobilize</u> (*i.e.*, physically engage) a chemical entity. As previously noted, there is absolutely no contact between a fiber in the Walt *et al.* optical array and an object being monitored. Indeed, the GRIN lens is between the fiber and the object. Furthermore, the GRIN lens never contacts the object being monitored.

<u>Rebuttal point no. 6</u>: As previously discussed, the Examiner alleged that fixture (86) is a separator that affects the distance between the end of a fiber and a sensor. It was pointed out that: fixture (86) doesn't serve this purpose and, even if it did, that is irrelevant to the claims under consideration. Even so, the Examiner's stated reason for combining the Walt

et al. and Narayannan was that such a fixture (86) would enable the fiber array to be held as close as possible to the sensing surface of the sensor. But applicant's separator doesn't pertain to the end of the fibers that are near the sensor.

Returning to the language of claim 1, the sensor "is suitable for spatially separating said optical fibers from one another in a pattern that enables said optical fibers to engage individual samples on a sample plate." In applicant's invention, the separator affects the spatial separation at the sampling end, not the sensing end. As depicted, for example, in FIGS. 1, 4, and 5, the spacing of the fiber is FIXED; the separator does NOT affect the spatial separation of the fibers at the sensor.

Neither Walt *et al.* nor Narayannan, alone or in combination, disclose or suggest what is recited in amended claim 1. As a consequence, claim 1 is allowable over these references. By virtue of their dependence on claim 1, claims 2 through 7 are likewise allowable. The recitation of additional patentable features in claims 2 through 7 provides a secondary basis for patentability.

Claims 8-11 are Allowable
Over the Art of Record

Amended independent claim 8 recites a method comprising:

> physically engaging a chemical entity to a first end of an IR-transmitting fiber;
>
> bringing said chemical entity in contact with a binding compound; and
>
> conducting a thermal signal resulting from a binding interaction to a thermal sensor through said IR-transmitting fiber, wherein said binding interaction occurs between said chemical entity and said binding compound.

The Examiner rejected claim 8 as being anticipated by Walt *et al*. But this reference does not disclose what is recited in amended claim 8. Namely, Walt *et al*. provides no disclosure of "physically engaging a chemical entity to a first end of an IR-transmitting fiber."

Aside from the fact that Walt *et al*. does not disclose use of an IR-transmitting fiber, Walt *et al*. teaches away from any contact between the end of an optical fiber an a chemical entity as previously discussed. In particular, a GRIN lens is disposed at the end of the optical array. The GRIN lens was considered by Walt *et al.* to be an "essential element" of the invention. (*See*, *e.g.*, col. 6, lines 32-67, *etc.*)

Since Walt *et al.* does not disclose or even suggest what is recited in amended claim 8, that claim is allowable over the cited art. By virtue of their dependence on claim 8, claims 9 through 11 are likewise allowable. The recitation of additional patentable features in claims 9 through 11 provides a secondary basis for patentability.

Claims 12-15 are Allowable
<u>Over the Art of Record</u>

Amended independent claim 12 recites a method comprising:

> positioning a movable separator along a plurality of IR-transmitting fibers to obtain a desired spacing between adjacent IR-transmitting fibers at a sampling end thereof; and
>
> conducting a thermal signal through at least one of said IR-transmitting fibers.

The Examiner rejected claim 12 as being anticipated by Walt *et al*. But this reference does not disclose what is recited in amended claim 12. Namely, Walt *et al*. provides no disclosure of "positioning a movable separator along a plurality of IR-transmitting fibers to obtain a desired spacing between said adjacent fibers at one end thereof."

As discussed above, the fibers in the optical array of Walt *et al*. are disposed in a fixed and predetermined position. Since Walt *et al.* does not disclose or even suggest what is recited in amended claim 12, that claim is allowable over the cited art. By virtue of their dependence on claim 12, claims 13 through 15 are likewise allowable. The recitation of additional patentable features in claims 13 through 15 provides a secondary basis for patentability.

<u>Conclusion</u>

It is believed that claims 1-15 now presented for examination are in condition for allowance. A notice to that effect is solicited.

Respectfully,
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